Nov. 3, 1964 A. DIETZ 3,154,910

STRANDED SPIRAL ROPE

Filed May 3, 1962 2 Sheets-Sheet 1

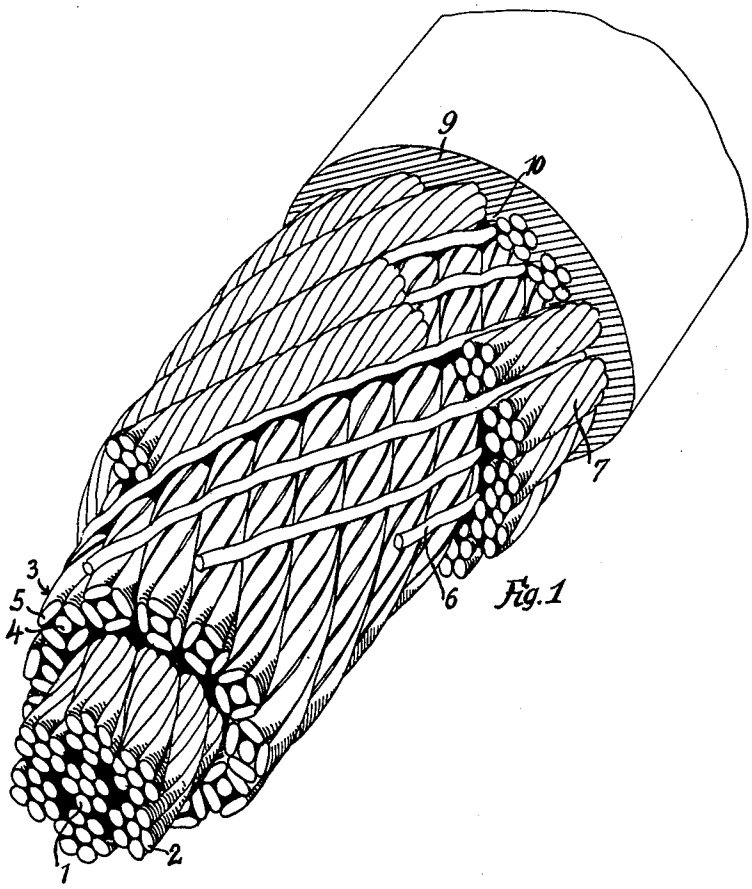

Fig. 1

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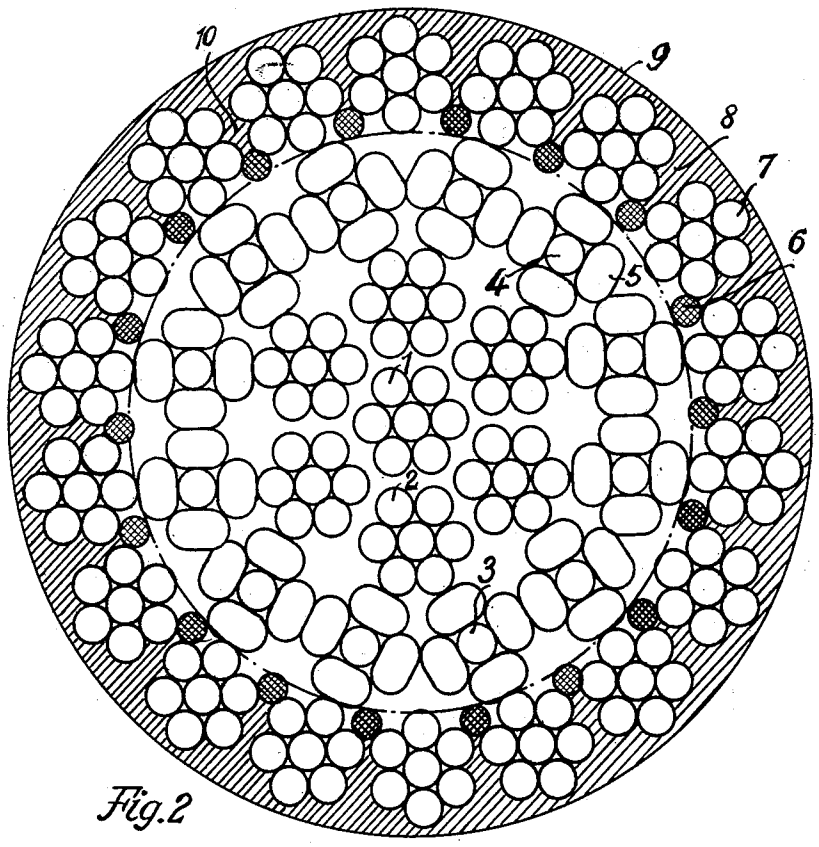

Fig.2

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United States Patent Office 3,154,910 Patented Nov. 3, 1964

3,154,910

STRANDED SPIRAL ROPE

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Filed May 3, 1962, Ser. No. 192,156
Claims priority, application Germany May 5, 1961
2 Claims. (Cl. 57—149)

The invention relates to a rope formed of spirally wound strands completely surrounded by a plastic sheathing having projections extending into and filling gaps of dovetailed cross section defined between the outer strands of the rope, which are disposed at a certain distance from each other.

In accordance with the invention, a rope of this structure is further improved by the fact that the outer strands are twisted in the opposite sense to the spiral winding of the strands forming the rope core. Underlying the gaps are supporting wires disposed in parallel lay to the outer strands, on which supporting wires the ends of the dovetail-like projections of the plastic sheathing abut. In this way, the outer strands, the sheathing and the supporting wires together form a compression protection ring which, as a compact unit, largely screens and protects the interior of the rope from harmful radial pressures which, as is known, rapidly destroy the internal structure of the rope.

The advantage of this new type of rope structure stems not least from the fact that the outer strands aided by the supporting wires are seated reliably and properly spaced, their distance from each other being simultaneously assured and the co-operation between the plastic sheathing and the supporting wires preventing any undesirable spreading of the outer strands.

The rope core may consist of a strong core strand, on which the outer strands are immediately spirally wound, or else of a core and intermediate strands composed in the usual manner of round wires or, in accordance with a preferred form of the invention, inner strands with flat wrapped wires are used, which provide especially favourable contact conditions.

The supporting wires may, as dictated by need or circumstance, consist of either metal or plastic. They pass over the rope core opposed to the strands forming this core, but in parallel lay to the outer strands, that is in the same direction and at the same pitch as these outer strands, in such a way that one supporting wire is disposed between each two outer strands.

When the thermoplastic plastic sheathing is applied to the rope, it penetrates the gaps between the outer strands to such an extent that it permeates these in substantially dovetail form, finally abutting with the lower ends of the plastic material projections thus formed on the supporting wires.

Experience shows that this causes the outer strand layer with plastic sheathing and supporting wires to form a protective cladding around the inner rope elements, which cladding, while in no way detracting from the flexibility of the rope, largely absorbs the radial forces of compression arising when tensile stress is applied to the rope or when it runs over pulleys, so that the rope core is lastingly preserved against harmful wire-ragging or damage through crushing.

The accompanying drawing illustrates the invention by way of example.

FIG. 1 is a perspective view of the rope of the invention, while

FIG. 2 is a section through the rope.

The same reference characters designate like parts in both figures.

Around a core strand 1 composed of 1 x 6 round wires

a core layer of strands 2 is twisted, whereby the elements 1 and 2 may be regarded as the actual rope core. Around this rope core an inner layer of strands 3 is laid, whose peculiarity here consists in the fact that core wire 4 is sheathed by flat wires 5 rounded off at both extremities of section.

The purpose of this flat-wire sheathing is to enlarge the seating area of the inner strands and thus reduce the harmful effects arising from the radial, inward pressure from the outer strands when the rope is under stress.

Over the layer of inner strands 3 are twisted in accordance with the invention supporting wires 6 in the opposite sense to the inner strands. According to FIG. 1 these inner strands run counter-clockwise, whereas the supporting wires 6 run clockwise. The outer strands 7 are then also twisted in this same clockwise lay and in the same pitch as supporting wires 6. The disposition is such that the individual supporting wire always lies in the region below and between two outer strands 7. In this way the outer strands are held at a certain distance from each other, which distance appears as gap 8 and whose size can be more accurately fixed by the choice of appropriate supporting wires combined with the dimensioning of the outer strands.

FIG. 2 of the drawing clearly shows that, on the one hand, where the outer strands 7 are in contact with the inner strands 3, the bottommost round wire of the outer strand is in contact with flat wire 5 of the inner strand, while on the other hand each outer strand is held below by two supporting wires 6.

In this way, the overall seating of the outer strands on the "rope core" can be materially enhanced as against conventional designs, thus minimizing specific surface pressure with its unpleasant consequences arising from wire contacting.

The entire rope is surrounded by a plastic, for example polyamide, sheathing 9 in such a way that projections 10 of the plastic material penetrate into the gaps 8 between the outer strands 7 sufficiently deeply as to be secured in the form of a dovetail. Accordingly, the sheathing cannot possibly become detached from the outer strand layer while the rope is working. The projections 10 extend so deeply into the gaps 8 as to reach the supporting wires 6.

FIG. 2 shows that in this way a firm protective ring is formed, composed of the supporting wires 6, the outer strands 7 and the plastic sheathing 9 and covering the rope core 1, 2 and the inner strands 3 like a shield. This protects the interior of the rope from centres of compression, such as occur when, for example, sudden rope stresses are necessary on an excavator or the like.

As mentioned above, other types of rope construction can be used, differing mainly in that the inner strands 3 are not wrapped with flat wires but consist solely of round wires. The number of strand layers and the formation of the rope can also be varied.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A rope comprising, in combination:
(a) a rope core formed of at least one spirally twisted strand,
(b) a layer of outer spirally twisted strands surrounding the core and spirally wound about the core in a direction opposite to that of the core, the outer strands defining lateral spaces therebetween,
(c) supporting wires running parallel to the outer strands and arranged between each two of adjacent ones of the outer strands between the core and the strands for maintaining the lateral spaces, each supporting wire and the two adjacent outer strands defining circumferentially spaced and radially extending gaps of dovetailed cross section, and

(*d*) a plastic sheathing completely surrounding the layer of outer strands and having projections extending into and filling said gaps down to the supporting wires.

2. A rope comprising, in combination:

(*a*) a rope core formed of at least one spirally twisted strand,

(*b*) a layer of outer spirally twisted strands surrounding the core and spirally wound about the core in a direction opposite to that of the core, the outer strands defining lateral spaces therebetween,

(*c*) supporting wires running parallel to the outer strands and arranged between each two of adjacent ones of the outer strands between the core and the strands for maintaining the lateral spaces, each supporting wire and the two adjacent outer strands defining circumferentially spaced and radially extending gaps of dovetailed cross section,

(*d*) an intermediate layer of inner strands underlying the layer of outer strands, the inner strands comprising spirally twisted flat wires, one of said flat wires of the inner strands being in contact with an adjacent one of said outer strands, and

(*e*) a plastic sheathing completely surrounding the layer of outer strands and having projections extending into and filling said gaps down to the supporting wires.

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